INTERACTIONS BETWEEN PATIENTS AND NURSES
DURING HEMODIALYSIS

BY

BRETT A. RORER

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Chairman: Robert C. Ziller
Cochairman: Carolyn M. Tucker
Major Department: Psychology

The present study examined interactions between

patients and nurses in a hemodialysis unit. The goal of

the study was to identify behavioral characteristics of

patients and nurses that are associated with patient

compliance to hemodialysis fluid restrictions.

The Interaction Process Analysis (IPA) was employed

to code the behavioral events that occur during the

portion of the dialization procedure in which the patient

is being connected to the dialysis machine. The

behaviors examined for both patients and nurses were

emotionally positive responses, emotionally negative

responses, treatment related questions, and giving treatment related information. These events were examined with regard to patients' level of noncompliance to hemodialysis fluid restrictions. The only variables associated with patient noncompliance were emotionally positive and emotionally negative responses made by nurses. It was found that nurses emitted more emotionally positive and negative responses when interacting with noncompliant patients.

A post hoc analysis was conducted examining the relationship between the IPA response categories and nurses' length of time in dialysis nursing. Results indicated that length of time in dialysis nursing was negatively associated with nurses asking treatment related questions and positively associated with patients making emotionally positive and negative responses.

The following recommendations were made on the basis of the study results:

1. Hemodialysis nurses should receive training on patterns of noncompliance, the behavioral events that characterize nurse-patient interactions, and the basic principles of behavior change involved in compliance.

2. A noncompliance reduction program should be formally incorporated into the dialysis routine.

3. The program should include the systematic presentation of treatment related information contingent upon weight gain.

Noncompliance to medical regimens is widely
considered to be a major problem in health care.
Researchers, studying different samples and employing a
variety of methods, have reported levels of compliance
ranging from 18% to 89% of the prescribed regimen.
This degree of noncompliance and medical practitioners'
limited success in reducing it has led to a great deal
of frustration in the medical community.

The effectiveness of a medical regimen depends on
the efficacy of the regimen in treatment of the
disorder and how well the regimen is implemented. Most
regimens involve some active participation by the
patient. For some regimens, such as those for chronic
illnesses, patient compliance is essential for
successful treatment. Assuming that a prescribed
regimen is effective in the treatment of a disorder,
noncompliance to the regimen can make the regimen less
effective or ineffective. The consequences of
noncompliance include increased cost of health care,
nonimprovement or worsening of the disorder, and death.

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Medical regimens may be viewed as involving two technologies, physiological and behavioral. The technology of physiology has been increasing at a fantastic rate. Compliance, however, is a behavioral phenomenon. Advancement in the technology of behavior with regard to compliance has progressed much less. Pills are only effective when consumed and are most effective when consumed as prescribed.

The problem of compliance mostly concerns the medical practitioner's ability to extend his or her control beyond the immediate medical setting. In the clinic or physician's office patients will typically roll-up their sleeves or bend over when requested to do so. Compliance is quite high in the presence of the practitioner indicating a high degree of behavioral control. Statistics on the incidence of noncompliance suggests this control rapidly diminishes when the patient leaves the clinic or physician's office.

The following literature review will focus on the major approaches to the explanation, prediction, and control of compliance. A large number of personal and environmental variables have been examined with regard to the problem of compliance. Much of the research has stemmed from psychodynamic and behavioral principals.

Having reviewed the strengths and weaknesses of the compliance literature, a social learning approach to increasing compliance to the hemodialysis regimen will be proposed.

There are currently about 70,000 people in the United States receiving treatment for renal failure at a cost of approximately two billion dollars per year (Schwartz, 1984). The majority of these patients receive hemodialysis as treatment. Hemodialysis removes toxic fluids and metabolic end products from the blood stream via an artificial kidney machine. Most hemodialysis patients have their dialization treatments three times a week. However, these treatments are not sufficient to relieve the symptoms of renal failure. Patients are prescribed a complex regimen of dietary restrictions and medication.

The hemodialysis dietary regimen restricts the intake of sodium, potassium, protein, and fluid. The medication regimen includes a prescribed phosphate-binding medication and vitamin supplementation consisting of a multiple vitamin, folic acid, and iron supplement each day. In addition, many patients are prescribed medications to prevent blood clotting and control blood pressure. Noncompliance to dietary and medication regimens leads to dangerous concentrations of fluid and metabolic end products in

the blood stream. This can result in nausea, weakness, cardiovascular and respitory problems, and death. Despite the negative consequences of noncompliance, it is estimated that about one third of all patients fail to comply with dietary restrictions and about half do not comply with medication restrictions (Cummings et al., 1982).

The present study examines the interaction between patients and nurses during the dialization process and the relationship of the behavioral events to patients' level of compliance to fluid restrictions. It is proposed that nurse-patient interaction is central to patient compliance. Nurse-patient dyads are viewed here as groups and nurse-patient interactions as group process. Interactions between nurses and patients have typically been viewed in terms of the effect of one agent on the other. In the present study, the behavioral events occurring during interactions are viewed as the product of the ongoing reciprocal influence of both agents.

The goal of this study is to identify behavioral characteristics of patients and nurses that are associated with group effectiveness (i.e., patient compliance). There is little information available on the events that occur during interactions between hemodialysis patients and nurses. The data obtained in

this study are potentially valuable for improving the nurses' training program. Hemodialysis nurses at the North Florida Kidney Center (the setting of the present study) receive formal training on patient physiology and the dialization procedure but not on the behavioral processes involved in compliance. It is proposed that an understanting of these behavioral processes can be incorporated into the training program to effectively decrease noncompliance.

CHAPTER II
REVIEW OF THE LITERATURE

Compliance to Medical Regimens

Before reviewing the empirical and theoretical literature on compliance, it is useful to define compliance as it will be used in the present study. Such a definition is useful because the term has been used in a variety of ways as well as synonymously with other terms.

Definitions of Compliance

In the medical literature, compliance is variously defined in terms of a number of behavioral components including following diets, taking medicine, making lifestyle, social, and psychological adjustments, altering activities, following up on referrals, and keeping appointments. Haynes et al. (1979) provided the most widely cited definition which defines compliance as the extent to which a person's behavior corresponds with medical advice. Thus, the behavior of compliance is specified for the patient by the practitioner.

A variety of terms are used synonymously with or instead of compliance. The list includes adherence, obedience, cooperation, collaboration, and therapeutic alliance. These terms differ in the power relationship they specify between patient and practitioner. For instance, obedience refers to the subordinate position of the patient to that of the practitioner. Adherence, on the other hand, implies no power structure. Rather, the patient is considered a free agent in his or her behavior with regard to medical advice. In the present study compliance will be used as it was defined by Haynes et al.(1979). This definition is deemed superior because it involves only what the patient does and not motivations for performing behavior.

Range of Compliance

The range of patient compliance is well documented in the medical literature. Researchers, employing different methods and subject populations, have reported levels of compliance ranging from 18% to 89% (Epstein and Cluss, 1982). These studies may be categorized according to whether they involved short- or long-term treatment regimens. A review by Sackett and Snow (1979) indicates that the average level of compliance for short-term regimens is 62% and for long-term regimens 57%. It should be emphasized that

these are averages and there is a wide range of
variation within the two groups of studies.

Methods for Assessing Compliance

Because compliance to medical regimens encompasses
a diversity of behaviors and medical technologies, a
number of methods have been developed for assessing
compliance. These methods may be differentiated on the
basis of whether they involve direct or indirect
observations.

Direct Methods

Discussions of direct methods of assessing
compliance typically center on the quantitative or
qualitative analysis of body fluids. The most widely
used procedures are the blood/serum assay, urine assay,
and tracer method. A fourth method, one usually
omitted from discussions of direct methods, is the
measurement of body weight.

Blood/serum assay. An analysis of a blood sample
can be used to test for the ingestion of certain
substances including medications, food, and water. The
timing of the blood sample is critical to the accuracy
of blood/serum assay since ingested substances vary in
their rate of absorption and metabolism.

Urine assay. This procedure is used to test for excreted medication or drug metabolite. As with blood/serum assays, the timing of the sample is critical to the accuracy of the test. The urine assay is preferred over the blood/serum assay in testing for many substances because of the accessibility of the fluid sample.

Tracer method. This procedure employs the use of a tracer or "tag" which is added to a patient's food or medication. The tracer is typically used in conjunction with a urine assay although at times it is used with a blood/serum assay. Substances used as tracers must be pharmacologically and chemically inert, unaffected by the functioning of the digestive system, and freely excreted when used in conjunction with a urine assay.

Measurement of body weight. Weight gain or loss is an indicator of caloric intake, caloric expenditure, and/or fluid consumption. This method of assessing compliance is most common in the assessment of compliance to weight loss and hemodialysis regimens. Measurement of body weight is the least accurate of the direct methods and there is some debate as to whether it should be included as a direct method of assessment (Haynes et al., 1979).

Limitations of Direct Methods

While the analysis of body fluids and weight gain provides objective measures of compliance, there are a number of limitations to these methods. First, the cost of fluid analysis has precluded routine use of these tests for many regimens. Fluid assays are usually implemented after a clinical judgement of noncompliance has been made. Second, for many substances fluid assays do not provide information on patients' overall patterns of compliance. For example, fluid assays can render information on the half-life of many drugs. Since drugs are metabolized and excreted by the body, the assay yields information only on doses taken just prior to the fluid sample. Patients can present the illusion of overall compliance by taking the appropriate doses before fluids are taken.

The accuracy of fluid assays is also limited by individual differences in metabolism and rate of absorption as well as problems of bioavailability of substances resulting from interactions with other substances. Individual differences in metabolism and rate of absorption can be controlled for by determining a baseline through the direct administration of the substance to be tested for and subsequent fluid testing (Newsholme and Start, 1973). However, the expense and

time of this procedure are prohibitive to widespread use.

Indirect Methods

An indirect method of assessing compliance is any procedure that involves inferences about compliance based on indirect observations. These procedures are less accurate than direct measures although accuracy can be as good or better when indirect measures are used in combination or in conjunction with direct measures (Litt and Cuskey, 1980). The most widely used indirect methods are pill and bottle counts, self-reports, treatment outcome, and physician estimate.

Pill and bottle counts. This procedure is used to estimate compliance by comparing the number of pills or volume of fluid remaining in a prescription container to what which was prescribed for a particular time period. The number of pills or volume of fluid is either directly observed by the practitioner or self-reported by the patient.

The most significant problem associated with this method is that it merely indicates what is left in the container. There is no guarantee that what was removed was consumed. Patients can easily deceive the practitioner by taking the appropriate amount of

medication from the container prior to the count.
Research comparing pill and bottle counts with urine
assays indicates that the counts typically overestimate
compliance (Bergman and Werner, 1973).

Several strategies have been used to avoid the
problem of patients discarding medicine in bulk prior
to inspection by the practitioner. One approach has
been to make unannounced pill or bottle counts or make
the patient unaware that such a count is being made
(Cf., Boyd et al., 1974; Envey and Goldstein, 1976;
Haynes et al., 1976; Linkewich et al., 1974; Sharpe
and Mikleal, 1974). In a more elaborate effort,
several researchers have employed mechanical devices
that record the number and time sequence of medication
removal from containers (Moulding et al., 1970;
Norell, 1979). However, as accurately as these devices
record the removal of medication, ingestion of the
medication is not recorded. Mechanical methods do
provide some information as to whether a patient
understands prescription instructions.

Self-reports. The self-report relies on the
patient to provide information on his or her own
behavior. The accuracy of the self-report is related
to the role of the practitioner (e.g., physician,
nurse, technician, psychologist, student), the wording
of questions presented to the patient, the patient's

recall ability, and the repercussions of compliance or noncompliance. Although several studies have reported accurate self-reports of compliance (Hogan et al., 1983; Malahy, 1966), research generally indicates that self-reports overestimate compliance (Epstein and Cluss, 1982). A study by Rickels and Briscoe (1970) found that self-reporting accuracy is least with smaller deviations from the prescription than with gross deviations.

While research indicates that patients often overestimate compliance, this research also indicates that patients who report noncompliance typically do so accurately as determined by fluid assays (Gordis et al., 1969; Lund et al., 1964; Sackett, 1979). This finding is especially significant in the light of other research that found that the patients most likely to respond favorably to interventions designed to increase compliance were those who initially admitted noncompliance (Haynes et al., 1976).

Treatment outcome. Reliance on treatment outcome to assess compliance is based on the assumption that prescribed medical regimens are efficacious in treating the patient's disorder. It is further assumed that when a patient improves it is the result of a high degree of compliance to the prescribed regimen. However, patients may improve for reasons unrelated to

the medical regimen or through partial compliance. Moreover, compliant patients may fail to improve. These limitations to the use of treatment outcomes for assessment of compliance are illustrated by a study of hypertensive steel workers. Taylor (1970) found that two-thirds of compliant patients achieved blood pressure control while one third of noncompliant patients gained such control.

Practitioner estimate. Medical practitioners are often forced or elect to estimate compliance in the absence of other indicators. A large body of literature has revealed the inaccuracy of practitioner estimates. A study by Davis (1966) found that medical students were as accurate as attending physicians in assessing compliance. Other researchers (Caron and Roth, 1971; Charney et al., 1967) have found that estimates of physicians are often no better or only slightly better than chance. Despite the inaccuracy, practitioner estimates remain one of the most common methods for assessing compliance.

Factors Associated with Compliance

In their review of the compliance literature, Haynes et al. (1979) identified 200 factors that have been examined with regard to compliance. This diversity of variables reflects the multidisciplinary

nature of compliance researchers and, perhaps, frustration over the high incidence of noncompliance and patient resistance to efforts to increase compliance. Two major content areas have emerged from the literature: features of the illness and medical regimen, and patient variables.

Features of the Illness and Medical Regimen

In a comprehensive review of illness and regimen factors, Haynes (1979a) identified 77 studies examining these variables. Haynes concluded that features of the illness are, for the most part, poor predictors of compliance. Less than half of the studies found significant relationships. Of these studies, consistent results were obtained for only a few factors.

Some of the experimental findings were surprising in that they refute common beliefs. For example, no study has found that increasing severity of symptoms leads to increased compliance. In fact, four studies found a negative correlation between symptom severity and compliance (Baekeland et al., 1973; Hurtado et al., 1973; Joyce, 1962; Lipman et al., 1965).

Similarly, studies of disease severity have found no consistent results with regard to compliance. Six of 13 studies in the Haynes (1979a) review found a

significant correlation; however, the direction of the relationship was not consistent across studies. For example, Mausner et al. (1968) found that heavy smokers were more likely to comply to a smoking withdrawl program than light smokers. Two other studies found the opposite (Jacobs, 1972; Kanzler et al., 1976). Other variables that have not been found to be related or consistently related to compliance include previous bouts with the illness, recency of last attack, previous hospitalization, length of stay in hospital, clinical improvement, and concurrent illnesses.

There are a few exceptions to the conclusion that disease factors are not good predictors of compliance. Studies of psychiatric patients (Alpert, 1964; Atkinson, 1971; Carr and Wittenbaugh, 1968; Hogan et al., 1983) indicate that patients with schizophrenia, paranoid features, and personality disorders are less compliant than patients with other disorders. The degree of disability resulting from an illness has been found to be predictive of compliance. Several studies (Donabedian and Rosenfeld, 1964; Heinzelman, 1962; Hertroijs, 1974) have found that as the degree of disability increases so does compliance. However, the increase in compliance may be due to the increased

medical attention that accompanies the increase in disability (Jones, 1983).

While research examining features of the illness has met with little success in predicting compliance, the study of features of the treatment regimen has revealed several good predictors. Perhaps the most significant finding of this research is the relationship between compliance and duration of treatment. The literature consistently indicates that compliance decreases with time (Haynes, 1979b; Sackett and Snow, 1979).

Complexity of the treatment regimen has also been found to be a predictor of compliance. In general, as regimen complexity increasess, compliance decreases. This is especially significant if the treatment regimen involves substantial modifications of lifestyle and personal habits such as diet and alcohol consumption (Cummings et al., 1982). Some researchers have attempted to simplify regimens involving medication by reducing the number of doses taken thus simplifing the regimen. The results have been mixed with some studies finding increases in compliance (Brand et al., 1977; Gatley, 1968) and others finding no significant changes in compliance (Lima et al., 1976; McInnis, 1970; Parkin et al., 1976).

Finally, the cost of health care has been shown to be related to compliance with increased cost being accompanied by lower compliance (Alpert, 1964; Brand et al., 1977; Hemminki and Heikkila, 1975). The research on cost of health care, however, typically reports only hospital or clinic costs and physician's fees. A more accurate estimate would include lost wages to the patient, transportation, babysitting, the cost of special diets, etc.

Patient Variables

A large number of patient variables have been examined with regard to compliance. Five areas have received the most research interest: demographic features, locus of control, health beliefs, active involvement in treatment, and patient social interaction.

Demographic features. Numerous studies have looked for demographic characteristics associated with compliance. Table 2-1 summarizes the findings of more than 200 studies reviewed by Haynes et al. (1979) that examined the relationship between one or more demographic variables and compliance. As the table indicates, the majority of studies found no significant relationship between the patient's demographic make-up and level of compliance.

Table 2-1. Summary of Demographic Variables:
Number of Study Findings in Relation to Compliance

Relationship to Compliance

Variable	Positive	Negative	None
Age	29	14	77
Education	24	3	49
Socioeconomic status	16	1	23
Occupational status	14	1	22
Income	6	2	20
Urban vs. rural	1	1	2
Race (white vs. others)	9	2	25
Ethnic background	Association found: 2		9
Religion	Association found: 2		6
Marital status	Association found: 2		26
Sex	Association found: 28		65

Adapted from: Haynes et al., (1979)

Locus of control. Locus of control, a personality variable originally proposed by Rotter (1966), refers to individuals' generalized tendency to believe that the control of events in their lives is either internal (personal) or external (environmental). Rotter (1966) developed the Internal-External Scale to measure this construct. Individuals having an external locus of control are likely to believe that what happens to them is due to chance, luck, fate, or the power of others. Individuals having an internal locus of control believe that what happens to them is a function of their own actions or attributes.

Locus of control theory predicts that patients with an internal locus of control are more likely to believe that their compliance to a prescribed medical regimen will be efficacious in the treatment of an illness. Patients with an external locus of control are predicted to believe that their participation in treatment will be ineffective and thus be less compliant.

Empirical findings have only partially supported locus of control theory with more studies reporting no association or negative associations than studies finding results consistent with theory based predictions. Research on the relationship between locus of control and compliance to the hemodialysis

regimen is illustrative of these mixed findings. Several studies (Poll and De-Nour, 1980; Wenerowicz et al., 1978) have reported positive results while other studies (Blackburn, 1977; Kilpatrick et al., 1972; Towne and Alexander, 1980) reported finding no significant relationship.

Health beliefs. Patients' beliefs about the efficacy of performing prescribed treatment behavior are the basis of the Health Belief Model. This model was developed for the prediction of patients' compliance to treatment regimens. The model is based on the decision-making concepts of valence and subjective probability. Valence refers to the attractiveness of a goal or end state to the individual. Subjective probability is the individual's estimate of the likelihood of goal attainment through the performance of a particular behavior. The model posits that whether or not a person performs a recommended health behavior is a function of the person's perception of his or her susceptability to the illness or condition, the severity of consequences of the illness or condition, the health behavior's potential efficacy in preventing or reducing suceptibility and/or severity, and barriers or costs related to initiating or continuing the recommended

behavior. These barriers may be physical,
psychological, and/or financial. In addition to the
above perceptions, the Health Belief Model also posits
that a stimulus or cue to action is necessary to
initiate health behavior.

The Health Belief Model has generated a large
volume of research. A number of recent studies have
reported findings consistent with the Health Belief
Model (Calnan and Moss, 1984; Cummings et al., 1982,
Ferguson and Giles, 1979; Roberts et al., 1984;
Windsor et al., 1983). However, two reviews of the
literature on the model (Haynes, 1979; Sackett and
Snow, 1979) concluded that the overall pattern of
findings is mixed with as many studies reporting
nonsupportive findings as supportive ones.

Active involvement in treatment. Research has
examined the relationship between compliance and the
patient's level of active involvement in treatment.
Tucker et al. (1984) found a positive relationship
between compliance and patient active participation in
the dialization procedure among hemodialysis patients.

Haynes et al. (1976) experimentally manipulated
patient participation in a group of hypertensive
subjects. The manipulation involved having
noncompliant patients take their own blood pressure at

home. A significant increase in compliance was reported.

Johnson et al. (1978) conducted a similar study which employed the use of home blood pressure recording. This study failed to replicate the Haynes et al. (1976) study. The body of research on active involvement in treatment is not extensive enough to draw any firm conclusions on the effect on compliance of implementing programs to increase active involvement.

Patient social interaction. The study of patients' engagement in social interaction has revealed several factors associated with compliance. The major focus of research has been on family life. Family characteristics positively associated with compliance include family support for compliance (Commings, 1970; Greenberg et al., 1973; Kaplan and Czaczkes, 1972), marital adjustment (Farmer et al., 1979; Hartman and Becker, 1978; Sommer, 1984; Steidl et al., 1980), communication within the family (Pentacost, 1970; Pentacost et al., 1976), and the maintenance of a sexual relationship with the spouse (Abram et al., 1975; Steele et al., 1976).

Other research has examined social interaction with nonfamily persons. These studies have generally

found that the higher a patient's level of social
interaction, the higher the patient's level of
compliance (e.g., Porter, 1969, Procci, 1978; Sommer,
1984).

Strategies for Improving Compliance

The problem of noncompliance to medical regimens
is widespread, involves a multiplicity of health
disorders and behaviors, and has been approached by a
diversity of medical practitioners. It is not
surprising, then, that a variety of methods have been
used in attempts to improve compliance. These
strategies may be categorized according to whether they
employ educational or behavioral techniques.

Educational Strategies

Educational strategies rely on the transmission of
information about an illness and its treatment regimen
to patients which forms the potential for compliance.
Educational strategies are based on the assumption that
the more a patient knows about an illness and its
treatment regimen the higher the patient's degree of
compliance will be. Patient education is an aspect of
most treatment regimens. The most commonly used
educational methods are fixed content health messages,

individual patient counseling, counseling and written instruction, and programmed instruction.

Fixed content health messages. This approach has been used to examine the effect of various manners of presentation of educational material. It is called fixed content because all patients within a treatment group receive the same message. Most research has examined the effect of varying levels of fear, motivation, and/or differing sources of information on compliance. Evans et al. (1970) used this method to improve dental hygiene among junior high school students. Information about dental hygiene practices was presented to subjects in one of five formats: high fear, low fear, positive appeal, recommendations only, and elaborated recommendations. Compliance with the recommended hygiene practices was measured through both self-reports and direct observation of the students' dental hygiene. The results of the study indicated that actual increases in compliance (as measured through direct observation) occurred only in the positive appeal and elaborated recommendations groups. Students in the high fear and recommendations only groups showed an increase in self-reported compliance but not in actual compliance.

While much research has obtained significant findings for message types, no single strategy has been demonstrated to be superior across settings. Contradictory and inconsistent findings characterize the literature and few conclusions can be made (Haynes, 1979a). Other studies have examined the effect of providing emotionally neutral information about compliance and illnesses. These studies have had mixed results. Behm and Land (1983) used a fixed content strategy for patients on a weight loss program. The fixed content messages were effective in increasing compliance to a dietary regimen. Weinstein et al. (1983) found no effect of fixed content messages on subjects' dental hygiene practices. One study (Swain and Sackett, 1978) found decreased compliance to an antihypertensive regimen following fixed content messages about the treatment regimen.

Individual patient counseling. Practitioners using individual patient counseling tailor the educational content to meet the needs of each patient. The major advantage of this approach is that it involves direct one-to-one interaction between the patient and practitioner. The literature includes studies in which counseling was given by physicians (Porter and McCullough, 1972), nurses (Malahy, 1966),

pharmacists (Rehder et al., 1980), professional health educators (Meyer and Henderson, 1974), and lay counselors (Hovell et al., 1984). Of these studies, only the Meyer and Henderson (1974) and Hovel et al. (1984) resulted in increased compliance. Hovel and his collegues employed lay counselors to educate hypertensive patients. The counseling was comprised of a number of components including instruction on how to take medication in association with high frequency events (such as meals), instruction to keep the pill bottle in a highly visible place, and consultation on personal problems leading to noncompliance. The procedure resulted in a significant decrease in patients' blood pressure. Meyer and Henderson employed professional health educators to counsel cardiac patients as part of a behavior modification program with exercise, smoking reduction, and weight reduction as its behavioral endpoints. The counseling was effective in achieving those endpoints.

Counseling and written instructions. This method supplements individual patient counseling with written instructions for compliance. The advantage of the written instructions is that patients do not have to rely solely on memory of the interaction with the practitioner. Also, the individual counseling can help

to clarify written instructions. Surprisingly, little research has been conducted using this approach. Washington et al. (1983) used this approach to educate women on prenatal health practices. The written instructions and consultation consisted of a multicomponent package to teach a number of prenatal health behaviors. The results of the program were increased knowledge of the regimen by the treatment group over a control group. However, no data were collected on compliance to the practices. Reheder et al. (1980) combined pharmacy counseling, written instruction on a hypertensive regimen, and written information on the causes and effects of hypertension in an effort to increase compliance. The procedure failed to increase compliance.

Programmed instruction. A program of instruction begins with specifying the terminal knowledge to be obtained through the educational program. A program is then designed that will lead the patient to that end-state of knowledge. The program is comprised of a number of components which are learned one at a time sequentially. Programmed instruction is especially effective in teaching complex medical regimens (Haynes, 1979b).

This approach has been employed to train women on breast self-examination (Bloom et al., 1982; Pennypacker et al., 1982). The training consisted of nine components. Each component was trained separately following a general format of introduction and demonstration, practice on a silicon model, and practice on the trainee's own tissue. The training was demonstrated to be superior to previous training methods that presented instructions in their entirety. Programmed instruction has also been used to increase compliance among juvenile diabetics (Etzwiler and Robb, 1972) and hypertensives (Sackett et al., 1975).

Behavioral Strategies

Behavioral strategies for increasing compliance concentrate on the actual behaviors that are considered noncompliant. The three categories of behavioral strategies are stimulus control, self-control, and reinforcement control.

Stimulus control. Stimulus control methods seek to increase compliance by providing stimuli or cues that elicit compliant behavior. If a behavior is under stimulus control it should be possible to strengthen or weaken it by changes in the stimulus environment. Two techniques are commonly used:

1. Increasing Regimen Salience. Regimen salience can be increased by providing novel, brighter, or more numerous stimuli in the patient's environment. Examples of this approach include telephone reminders for appointments (Finnerty et al., 1973), signal alarms on medication containers (Azrin and Powell, 1969), pill flavoring (Epstein and Masek, 1978), and issuing regimen calanders (Liberman, 1972).

2. Tailoring Medical Regimens. Scheduling treatment related behavior to coincide with habitual events in patients' lives may increase the likelihood those behaviors will be emitted. For example, Norell (1980) tailored the use of eye drops for glaucoma patients to daily events in patients' lives (e.g., waking up, going to bed, meal times, work schedule). The tailoring resulted in a significant increase in on-schedule eye drop use.

In their review of stimulus control techniques, Epstein and Cluss (1982) concluded that the technique overall is effective in increasing compliance. However, experimental results have been mixed and it is not clear what procedures are effective in particular types of regimens.

Self-Control. Self-control of treatment related behaviors can be achieved through establishing patient

self-monitoring behavior. Self-monitoring of both
treatment related behavior and symptoms of the illness
has been demonstrated to be effective in the patient's
controlling of his or her treatment related behavior.
Three general strategies have been employed:

1. Self-Monitoring of Regimen. Self-control can
be facilitated by having a patient monitor and record
treatment related behavior. Most research has
concentrated on medication intake. Wandless and Davie
(1977) compared a self-monitoring pill calander
strategy with oral instruction and written instruction
for geriatric patients on multiple medications. The
self-monitoring group was more compliant than the other
two groups. Epstein and Masek (1978) showed pill
calanders to be superior to pill flavoring in changing
short-term vitamin intake.

2. Self-monitoring of Symptoms. Patients may
self-monitor their symptoms either through direct
measurement or through charting feedback given by the
practitioner. The findings of studies using
self-monitoring of symptoms have, for the most part,
shown the method to be ineffective. Carnahan and
Nugent (1975) and Johnson et al. (1978) found no
significant effect of self-monitoring of symptoms on
the control of blood pressure. Epstein et al. (1981)
had insulin-dependent children self-monitor urine

glucose. Their level of compliance did not differ from a control group.

3. Self-regulation of Regimen. This approach combines self-monitoring of treatment behavior and self-monitoring of symptoms. The patient regulates his or her own treatment regimen according to treatment outcome. The method is most effective when there is a close relationship between related behavior and symptom reduction.

Bessnab et al. (1980) conducted a widely cited study using self-regulation of medication dosage. Patients in the study self-monitored blood pressure and self-selected a drug regimen of hypertensives. These patients had significantly lower blood pressure than a control group that had a physician prescribed drug regimen. Similarly, Nessman et al. (1980) used a self-regulation strategy coupled with self-monitoring of blood pressure for hypertensive patients. The procedure resulted in a significant decrease in patients' blood pressure. Other studies that have used this method include self-regulation of insulin (Epstein et al., 1981), self-regulation of antihypertensives coupled with self-charting of medication (Haynes et al., 1976), and self-regulated use of eye drops for glaucoma (Norell, 1980, 1979).

Self-regulation of regimens appears to be an effective method for increasing compliance but it has several limitations. First, not all regimens benefit from self-regulation. For example, a 10-day penicillin regimen is often prescribed for treatment of streptococcal pharyngitis, impetigo, and otitis media. This regimen is maximally effective when taken as prescribed without variation. Second, the patient must have some criteria for self-regulation. These criteria must not be time and cost prohibitive.

Reinforcement Control Methods. Reinforcement control methods differ from self-monitoring of treatment related behavior and symptoms in that the practitioner is directly the agent of behavior change. For this method to be effective the practitioner must be in control of some stimulus that affects patient compliance. Two strategies of reinforcement control are used:

1. Reinforcement of Compliance Conducive Behavior. Compliance can be increased by reinforcing compliant behavior thus increasing the likelihood of that behavior being emitted again. The counterpart to reinforcement is punishment of noncompliant behavior which decreases the likelihood that a behavior will be emitted. This method becomes less precise when the

practitioner has to rely on indirect assessment of compliance.

Several studies have employed direct assessment of compliance as the basis for reinforcement. Two studies of epileptic patients (Gibberd et al, 1970; Sherwin et al., 1973) found a significant increase in compliance to medication regimens after implementing serum testing for prescribed medication. Patients were given feedback on the goodness or badness of their compliance behavior based on their serum assays. Azrin and Powell (1969) used a behaviorally engineered pill bottle that sounded an alarm at the time at which patients were scheduled to take medication. The alarm could be escaped by removing medication after the onset of the alarm. Results indicated an increase of on-schedule medication removal with use of the aversive stimulus. Bigelow et al. (1976) had alcoholics earn back part of a security deposit each time they returned to a clinic to receive a dose of Antabuse. Results showed a decrease in alcohol consumption during the treatment period.

2. Reinforcement of Symptom Reduction. This method makes reinforcement contingent upon the outcome or assumed outcome of compliance behavior rather than on the behavior itself. Haynes et al. (1976) offered

subjects a four dollar credit toward the purchase of a blood pressure cuff each time their diastolic blood pressure was below 90 mmHg upon their return to a clinic. The procedure resulted in a significant decrease in blood pressure. Epstein et al. (1981) successfully used a point economy to increase compliance among diabetic children. Subjects received points for having no or small amounts of sugar in their urine. When enough points were earned within a specified time period, a "smiley face" sticker was placed on the patients' weekly medical charts. Blount and Stokes (1984) increased dental hygiene among elementary school children by posting subjects' photographs in their school contingent upon plaque reduction. Colvin et al. (1983) used a monetary reinforcer to increase weight loss among obese subjects.

The use of praise as a reinforcer has been found to be effective in particular circumstances. Gross et al. (1983) used praise to increase accurate self-estimation of blood glucose among diabetic patients. Collins et al. (1981) praised symptom reduction among myopic patients resulting in a significant decrease in symptoms. Finally, Weinstein et al. (1983) used a package of verbal reinforcement

along with cueing and chart monitoring to increase
plaque reduction.

While reinforcement control methods are generally
effective, there are limitations to its more widespread
use. First, the practitioner must control some
stimulus or stimuli that are functionally reinforcers.
Praise may be a reinforcer in some circumstances but
not in others. Budgetary considerations preclude the
use of money for many institutions and practitioners.
Second, reinforcing both compliant behavior and symptom
reduction often requires interaction between patient
and practitioner. The time and cost of this are
prohibitive for many patients and practitioners.

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Compliance to Medical Regimens:
A Summary and Analysis

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A large number of studies have been presented in
the medical and behavioral literature dealing with the
problem of noncompliance. These studies have provided
the medical practitioner with few solutions to this
complex problem. The compliance literature may be
summarized as follows:

1. The traditional approach of looking for stable
personality characteristics of the patient has been of
little value. This approach has assumed that these
characteristics are consistently related to compliance

regardless of the behavior specified by the regimen. In other words, a personality characteristic would equally affect pill taking, dietary restrictions, and cigarette smoking. This assumption has not been supported.

2. Compliance researchers have been looking for common threads running through too diverse a set of behaviors. The set of behaviors should be broken down into units based on the response classes involved. These units should then be independently analyzed.

3. Compliance appears more related to characteristics of the medical regimen than to patient characteristics. At the broadest level, compliance is higher in short-term regimens than in long-term regimens. Regimens requiring major changes in lifestyle and personal habits are characterized by lower levels of compliance than those requiring less substantial change. On the other hand, patient characteristics such as demographic make-up have not been shown to be systematically related to compliance.

4. Much complaince research suffers from a number of methodological problems. Some of these problems are dictated by the nature of the medical setting. Compliance researchers must often work within procedures established in health care facilities and

have a limited range of behavior in those settings.
Also, researchers are limited by the nature of the
medical regimens being studied. With some regimens
even slight variations could be life threatening.

Other problems are due to the procedures selected
by the researchers. For instance, a variety of
personality inventories have been used on patient
populations. A question remains as to whether these
instruments are valid for these patients when they were
developed on "normal" populations. An example of this
is the large number of studies examining psychological
characteristics of hemodialysis patients. These
studies have employed a variety of commonly used
psychological tests including the MMPI, Rotter I-E
scale, Life Events Scale, Social Adjustment Scale
Self-Report, and Wechsler Adult Intelligence Scale.
Some researchers have questioned the use of such tests
on dialysis populations because these patients are
considered to be uniquely dependent on the dialysis
staff, have a strong tendency to respond to personal
questions with socially desirable answers, and to
withdraw from or display hostility toward mental health
professionals (Tucker et al., 1981; Yanagida and
Streltzer, 1979).

5. Educational approaches to increasing compliance vary in effectiveness for particular patients and health disorders. Significant findings have been reported; however, none of the methods have been found to be consistently related to compliance. Haynes (1979a) reviewed educational approaches to compliance and found that less than 10 percent resulted in increased compliance. The majority of studies using this approach confounded the effectiveness of one method by combining it with behavioral strategies or with one or more other educational strategies.

6. Across patient populations and health disorders, behavioral approaches have been superior to other approaches in increasing compliance. However, no single method has been found to be superior across treatment regimens. There are no studies reported in the literature examining the differences in effectiveness of particular behavioral strategies on compliance to one or more types of regimen.

The Hemodialysis Regimen

Hemodialysis is based on the principle of dialysis which involves the movement of disolved particles from one side of a semipermeable membrane to the other. During hemodialysis the patient's blood flows through a dialyzer which removes waste products and excess fluid. Once the blood is dialized it returns to the body less diluted by fluid and more free of toxins and waste products. Although hemodialysis is a life-saving procedure, it does not free the patient from problems associated with kidney failure. Normally functioning kidneys filter blood continuously; hemodialysis is performed two or three times a week. Consequently, the patient's body is in a constant state of fluctuation. Physiological problems commonly associated with kidney failure include fluid overload, hypertension, hyperkalema, anemia, and neuropathy.

Noncompliance to Hemodialysis

The success of hemodialysis as a treatment for renal failure is largely dependent on the patient's compliance to the medical regimen. In hemodialysis, the most active, influential theraputic agent is the patient. The objective of dietary management is to assist the dialysis procedure by reducing the amounts

of urea, potassium, sodium, phosphate, and fluid that accumulates in the blood between treatments. Noncompliance to the dietary regimen can result in nausea, weakness, cardiovascular problems, intellectual dysfunction, and death.

Despite the serious consequences, there is a high incidence of noncompliance to dietary and medication regimens among hemodialysis patients. It is estimated that 30% to 50% of patients fail to comply to fluid restrictions (Cummings et al., 1982). About 50% of patients do not comply with the medication regimen (Hartman and Becker, 1978).

Hemodialysis Settings

Hemodialysis may be carried out either in the patient's home or in a hospital or dialysis center located near a hospital. There has been an ongoing debate as to whether home or center dialysis is preferable. Perhaps the only point of agreement in this debate is that home dialysis is less expensive at $10,000 to $15,000 per year as compared to center dialysis at $25,000 to $30,000 per year. Advocates of home dialysis often point to this economic advantage. Despite the reduced cost, there has been a progressive decline in the percentage of patients on home dialysis

from 43% in 1973 to 11% in 1979 (Gibson, 1983). This
trend is continuing and is largely due to physician
disinterest in home training as well as a lack of
financial incentives for patients to choose home
dialysis.

The Hemodialysis Center Staff

Most hemodialysis centers have personnel serving
the following roles:

1. Physician. The physician determines the need
for dialysis and specifies the conditions under which
it will be performed. This includes determining the
specifics of treatment, communicating them to other
staff members, and modifying treatment according to
changes in the patient's condition.

2. Nurse. The nurse's role is central to
hemodialysis. Nurses perform the bulk of routine
medical care, have extended contact with the patient,
serve an educational function, and give emotional
support to both the patient and his or her family. The
specific function the nurse serves depends on the
locality, size, and type of facility (federal,
university, municipal, or private). Large centers
often have a head nurse who performs administrative
functions.

Hemodialysis nursing is considered to be particularly stressful (Rabin, 1983). This is due, in part, to the responsibilities of the nurse in the patient's treatment. Nurses are required to make numerous decisions which directly affect the patient's survival. Another major source of stress is the patient's behavior. Hemodialysis patients are often hostile, demanding, aggressive, unappreciative, and flirtatious. The effect of these types of behavior is that nurses often feel as if they are putting more into the social relationship with the patient than they are receiving. The stress of hemodialysis nursing is reflected in the high turnover rates in hemodialysis centers. The turnover rate at the North Florida Kidney Center averages around 50 percent yearly.

3. Technician. The role of staff technician varies across units. Technicians provide machine maintenance, act as nurses's aids, as well as provide dialysis therapy including starting, monitoring, and ending treatment. The technician's duties are limited to the routine aspects of the dialization process. This includes taking patients' vital signs, adjusting the dialysis machine to the appropriate settings, and insertion of the IV needle.

There is a growing trend in hemodialysis centers to replace certified nurses with technicians to reduce operating costs. Technicians are not qualified to respond to medical complications that occur during dialization such as fluctuations in respiratory or cardiovascular functioning. When such a situation occurs technicians turn patient care over to a nurse. Thus, as the ratio of technicians to nurses increases, nurses spend more time dealing with emergency situations and less on routine care. The effect of this has been to increase the stress on nurses (Rabin, 1983).

4. Renal Dietitian. The dietitian has primary responsibility for educating and counseling patients on the dietary regimen. Recently, emphasis has been placed on tailoring the dietary regimen to the patient's socio-econonic condition. Patients tend to comply more with medical regimens that require the least amount of lifestyle adjustment. Modifications of personal habits such as diet and alcohol consumption are the most resistent to change (Davis and Eichorn, 1963). The dietitian should modify the consumption of foods common to, liked by, and affordable to the patient rather than introducing novel and cost prohibitive foods.

Dietitians should perform dietary analyses of what patients are eating. Information on patients' diets is available through medical charts and routine blood/serum analyses. Other sources of information are available to the dietitian such as interviews with patients and family members.

5. Social Worker. The National Council of Nephrology Social Workers (Gibson, 1983) has described the two major activities of the hemodialysis social worker as 1) the development of an awareness of the social and psychological problems associated with hemodialysis, and 2) the development of means and methods to deal with such problems. Social workers should maintain contact with a psychiatric service in the case of major crises. Minor problems are directly addressed.

The Hemodialysis Nutritional Regimen

Theraputic dietetic regimens are necessary for successful treatment for renal failure. Indeed, before the development of modern dialysis procedures dietary manipulation was the only treatment for kidney failure. Early therapeutic diets were low in protein, high in calories, and quite unpalatable. The diets decreased the amount of circulating waste products in the blood

and offered the patient some relief from uremic symptoms.

Since one of the functions of the kidneys is to remove excess liquids and metabolic waste products in the blood, dietary restrictions of food and fluid will delay the need for dialysis. These restrictions also make patients more comfortable between treatments as well as during treatments (Greenberg, 1979). The particular diet prescribed for the patient depends on the type of kidney disease the person has and the severity of the disease. Patients' diets may be altered throughout treatment depending on changes in residual kidney function, other illnesses, or preparation for a kidney transplant.

While diets are individualized according to each patient's needs, all therapeutic diets impose the same basic restrictions. The nutritional objectives of hemodialysis are maintenance of water balance, restriction of potassium and sodium, minimization of protein catabolism, vitamin supplementation, and maintenance of adequate caloric intake (Greenberg, 1979).

Restriction of Potassium and Sodium. Potassium is found in considerable levels in most foods except pure carbohydrates. This makes it difficult for the renal

dietitian to design a diet acceptable to the patient and conducive to successful treatment. Foods that are high in potassium include bananas, peanuts, tomatoes, potatoes, chocolate, and citrus fruits. The normal daily intake of potassium for adults averages about four grams per day. Hemodialysis diets include about two grams of potassium per day.

Sodium restriction is critical to hemodialysis because sodium increases both thirst and fluid retention. Sodium is found naturally in most foods. Processed foods, in general, are very high in sodium. Some seafood is very high in sodium, as are some vegetables. The normal average intake of sodium is 35 to 45 grams per day. Hemodialysis diets prescribe about 20 grams per day.

Protein Restriction. Digestion breaks protein down into amino acids that are used by the body to produce tissue. Urea and nitrogen are waste products of this process.

Hemodialysis diets restrict the amount of protein consumed thus reducing the amount of urea and nitrogen in the blood. The average adult intake of protein is about 150 grams per day. This generally exceeds the body's requirements. Hemodialysis diets restrict protein intake to 60 to 80 grams per day depending on

the patient's body size and residual kidney
functioning. Minimizing urea and nitrogen in the blood
helps to alleviate nausea, vomiting, and lethargy
between dialysis treatments.

Vitamin Supplementation. It is necessary to
supplement hemodialysis diets with vitamins for two
reasons. First, protein restriction limits the intake
of certain vitamins in consumed food. Second,
water-soluble vitamins are removed from the blood
through dialysis. Patients are typically prescribed a
multiple vitamin, folic acid, and an iron supplement
each day.

Maintenance of Adequate Caloric Intake. The
importance of a high caloric intake for hemodialysis
patients is a function of the waste products resulting
from protein utilization. Dietary protein and protein
from muscle tissue are used as a source of energy if
energy from other sources is not available. The
utilization of protein for energy results in high
levels of urea and nitrogen. Hemodialysis patients are
allowed unrestricted intake of calories as long as they
are from foods low in potassium, sodium, and fluid.

Predictors of Compliance to Hemodialysis

Generally, research on predictors of compliance to hemodialysis is consistent with the larger body of research on medical compliance with many of the same variables being studied. Also consistent is the finding that few variables have emerged as good predictors of compliance to the hemodialysis regimen. The research derives largely from psychodynamic approaches and few behavioral data are reported in the literature.

Patient Variables. Of the numerous patient variables studied, the best predictors of compliance have derived from research based on the Health Belief Model. Several studies (Bollin and Hart, 1982; Cummings et al., 1982; Hartman and Becker, 1978; Becker, 1974) have reported findings consistent with the Health Belief Model.

Few other variables have been found to be consistently predictive of patient compliance to hemodialysis. Demographic variables have been examined numerous times with mixed results. For example, some studies have reported a significant relationship between compliance and marital status (Adler, 1975; Towne and Alexander, 1980), level of education (De-Nour and Czaczkes, 1976; Adler, 1975; Meldrum et al., 1968), age (Meldrum et al., 1968; De-Nour and

Czaczkes, 1976), and religious affiliation (Adler, 1975; Foster and Cohn, 1973).

Other studies have failed to support the relationship between compliance and marital status (Malmquist, 1973), level of education (Foster and Cohn, 1973; Sviland, 1972), age (Adler, 1975; Foster and Cohn, 1973; Sviland, 1972), and religious affiliation (Malmquist, 1973). The demographic variable that has received the most support as a predictor of complaince is work status. It has been found (Murawski et al., 1977; Farmer et al., 1979) that employment full or part-time or full-time housework is associated with compliance to the hemodialysis regimen.

The study of patient variables has also included several cognitive variables, most notably intelligence. The research on the relationship between compliance and intelligence has produced mixed results. The physiological effects of renal failure are likely to be associated with intellectual dysfunction (Greenberg et al., 1973). This dysfunction is largely reversible through dialysis and some studies have not controlled for the fluctuations in dysfunction.

Finally, the list of patient variables includes a number of personality characteristics. The most widely studied personality variable has been the patient's

locus of control. These studies (Poll and De-Nour, 1980; Wenerowicz et al., 1978; Blackburn, 1977; Kilpatrick et al., 1972; Towne and Alexander, 1980) were reviewed above and it is sufficient here to reiterate that locus of control has not emerged as a consistent predictor of conpliance. Several personality characteristics have been examined using the Minnesota Multiphasic Personality Inventory (MMPI). Only one variable included in the MMPI has received consistent support as a predictor of compliance. MMPI findings indicate that compliant patients have profiles indicative of highly developed denial (Short and Wilson, 1969; Sviland, 1972, Ziarnik et al., 1977).

Social-Environmental Variables. While patient variables have received little support as predictors of compliance, features of the patient's social environment have fared better. The major focus of research on the effects of the social environment on compliance has been on family life and the influence of the dialysis staff. Family life appears a particularly significant factor in compliance. Research indicates that compliance is related to the emotional quality of family life (Farmer et al., 1979; Hartman and Becker, 1978), family support for compliance to the treatment regimen (Sand et al., 1966; Greenberg et al., 1973;

Commings, 1970; De-Nour and Czaczkes, 1976),
communication within the family (Pentecost et al.,
1976), the maintenance of the nuclear family (Foster
and Cohn, 1973) and marital adjustment (Sommer, 1984).
Conversely, a general state of social isolation has
been found to be associated with noncompliance (Procci,
1978).

The interaction between patient and nurse is
widely believed to have a significant impact on patient
compliance although few relevant data exist. A number
of studies have been presented in the literature as
having examined nurse-patient interactions (Foster and
McKegney, 1977-78; Wertzel et al., 1977; De-Nour and
Czaczkes, 1976; Short and Wilson, 1969; Halper,
1971). Of these studies, none have involved direct
behavioral observations of nurse-patient interactions.
The studies have largely addressed the assumed
consequences of variations in the dyadic interactions.
For example, Foster and McKegney (1977-78) observed a
higher death rate among one group of patients over
another although the two groups did not differ in
biological or demographic parameters upon entry in the
study. The authors suggested that the dialysis staff
had unconsciously labeled the higher death rate group
as "bad" and gave poorer quality care to those

patients. Similarly, De-Nour and Czaczkes (1976) examined the relationship of staff expectations to staff-patient interactions. The authors found that expectations of patient compliance were related to actual levels of compliance. However, no observations were made on behavior that may have led to this relationship.

Only one study has been reported in which direct behavioral observations were made on nurse-patient interactions. Tucker et al. (1984) observed interactions during a 45-minute period during which patients were put on the machine and dialized. The findings indicated that compliant patients had a higher level of activity in their treatment and emitted more positive social behavior than noncompliant patients. However, the major focus of this study was patient behavior rather than that of the nurse.

Theoretical Orientations to Compliance

The majority of theoretically based compliance research has stemmed from two major theoretical perspectives: psychodynamic and behavioral. The psychodynamic orientation seeks to identify psychological variables (e.g., attitudes, health beliefs, personality traits) associated with

compliance. These person variables are generally assumed to play a causal role in compliance. While the literature is voluminous, psychological variables do not appear to be consistently associated with compliance. The one exception to this pattern of findings is the research based on the Health Belief Model. In general, patients' health beliefs have been predictive of compliance (Cummings et al., 1982).

In addition to the inconsistent pattern of findings stemming from the psychodynamic orientation, another question remains concerning its utility as the basis for therapeutic intervention. Prediction of compliance is useful but increasing and maintaining compliance is the ultimate goal. None of the studies involving person variables cited in the above literature review employed any type of manipulation of the variable being examined. Thus, there is no evidence, either supportive or nonsupportive, of the therapeutic potential of the psychodynamic approach.

The behavioral orientation concentrates on environmental factors that directly affect specific noncompliant behaviors. The basic techniques of behavior modification are employed including self-monitoring, reinforcement, and punishment. Instruction and education are also employed in a

secondary role. The goals of the behavioral orientation are specified as prevention of noncompliance, remediation of low compliance, and maintenance of high compliance (Dunbar et al., 1979).

Behavioral interventions have generally been successful in meeting the goals of the behavioral orientation (Epstein and Cluss, 1982). However, most research has been atheoretical with the major goal being clinical improvement of specific patient populations. The lack of basic research has prevented the emergence of an integrated behavioral therory concerning compliance.

A Social Learning Theory Approach to Compliance

The present study derives from a social learning perspective. This orientation takes into account both person and environmental variables as well as how the two affect each other. Little research on compliance has been conducted from this perspective. Behavioral and psychodynamic approaches have examined environmental and person variables respectively, but not how these variables interact.

Social learning posits that psychological functioning is a continuous reciprocal interaction between personal, behavioral, and environmental

determinants (Bandura, 1977). Behavioral dispositions
and the environment are not seperate entities; rather,
each determines the operation of the other.
Environments and personal attributes are seen as
potentialities that do not automatically act on each
other but instead interact. Within this framework,
symbolic, vicarious, and self-regulatory processes play
a central role (Bandura, 1969).

Through verbal and imaginal symbols, experiences
resulting from interactions with the environment can be
preserved in symbolic form. In this manner, people can
foresee the probable consequences of a behavior and
select to perform certain behavior on that basis.

The role of vicarious processes provides the
capacity for learning by observation or modeling. This
allows for the acquisition of behavior and patterns of
behavior without the individual having to perform the
behavior and have it reinforced.

Self-regulation involves the capacity of the
individual to arrange environmental inducements,
generate cognitive supports, and produce consequences
for his or her action. This provides the capacity for
people to exercise some control over their own
behavior. Self-regulatory functions are created and
partially supported by external (environmental)

influences but, once established, they are viewed as personal (internal) determinants of behavior.

Reciprocal Determinism

Throughout the last three decades, there has been a growing trend in psychology toward describing behavior as being a function of the interaction between the individual and environment. Conceptions of behavior as being predominantly controlled by traits or internal factors have received much criticism and little empirical support (e.g., Bem and Allen, 1974; Bowers, 1973; Endler, 1973; Magnusson, 1976; Mischel, 1968, 1977). The trait approach has been defended, most notably by Allport (1937, 1961, 1966). However, these arguments amount to little more than conjectures that if different procedures would be followed more variance in behavior could be accounted for.

Criticism has also been directed toward explanations of behavior in terms of environmental (external) factors (e.g., Bandura, 1969, 1977; Mischel, 1968). Supporters of the situationist position argue that there is little stability in personality and that variability in behavior is due to enviornmental variables (Skinner, 1974). The

situationist position, however, has received only slightly more empirical support than the trait position and has not accounted for a satisfactory amount of behavioral variance (Mischel, 1968).

Interactional approaches to behavior consider both internal (cognitive and personality) and external variables. A number of interactionals models have been presented (e.g., Bandura, 1977; Bowers, 1973; Ekehemmar, 1974; Endler, 1975; Mischel, 1973). These models may be categorized according to the nature of the causal relationship they specify.

One type of interactional model is formulated in terms of the analysis of variance model (e.g., Bowers, 1973; Mischel, 1973). It is depicted as $B=f(E,P)$. Causality in this model is unidirectional; it is from the environment and person to behavior. The person and environment are independent variables, while behavior is the dependent variable. Using this model, researchers examine the relative effect of person variables, situation variables, and the interaction between the two by evaluating the proportion of behavioral variance accounted for by each of those three components. Research based on this model has typically found that the interactional component accounts for the highest percent of behavioral

variance. However, the ANOVA model is a linear model and the interaction component specifies a nonreciprocal relationship between person and situational variables (Overton and Reese, 1973).

The other type of interactional model focuses on the psychological environment and the person as these effect and are affected by each other (e.g., Bandura, 1977; Endler, 1975). This model is depicted as $E=f(P)$, $P=f(E)$. The relationship between environmental and person variables is reciprocal or bicausal. Environmental and person variables are at the same time both dependent and independent variables. The ANOVA model, on the other hand, makes use of a common dependent variable.

The social learning theory view of behavior follows the bicausal model of interaction. Behavior, other person variables, and environmental variables are conceived as operating as interlocking determinants of each other. Interpersonal interactions are also viewed as proceeding in this manner. The social environment is seen as providing an especially wide latitude for creating contingencies that reciprocally affect the individual's behavior. For example, studies of dyadic interactions have demonstrated the reciprocal influence process. Research by Raush and his associated (Raush,

1965; Raush et al., 1974) has shown that the antecedent acts of one person strongly influence how others respond. Hostile or aggressive behavior typically elicits hostile or aggressive counter responses from others. Thus, the hostile individual is both a victim and architect of his or her hostile environment.

Social learning theorists have attempted to circumvent the limitations to the two major theoretical orientations to behavior change, those being radical behaviorism and the psychodynamic approach. Radical behaviorism is criticized because it ignores the role of cognitive functioning in behavior. Social learning theorists state that cognitive processes are essential to the causal analysis of behavior. Bandura (1977) argues that complex learning can take place only when the person is aware of what behaviors are being reinforced.

Social learning theory's criticism of the psychodynamic approach is broader and includes the theoretical orientation as well as the methodological precision with which it has been examined. Bandura (1969) views psychodynamic theorists as being preoccupied with internal response-producing agents which has resulted in a disregard of external

variables. Social learning theorists view internal constructs as ill-defined hypothetical states which furnish little direction for the selection of appropriate methods for behavior change.

The psychodynamic approach has also been criticized as failing to specify behavioral objectives. A meaningfully stated objective has at least two characteristics (Mager, 1961). First, the behavior appropriate to the desired outcome must be specified. Second, decisions are made about the events or experiences that are most likely to produce the desired outcome. A behavior change program may then be implemented based on the specified outcome and the arrangement of conditions that will create the desired behavior.

Once the goals and requisite conditions for behavior change are established, social learning theorists seek change agents who are best suited to implement a treatment program. Those persons who have the most intensive social contact with the target individual can serve as the most powerful agents of change if given appropriate training (Bandura, 1969). These agents' potential efficacy stems from their ability to exercise control over the conditions that actually regulate the desired behavior.

A well designed behavior change program begins with an analysis of the social conditions that maintain the behavior patterns of interest. It may be useful to demonstrate to the change agent how current conditions are maintaining the behavior to be changed. At this point, the change program can be implemented using detailed instruction, demonstrations, and supervised practice for the change agent.

A Social Learning Theory Approach to Hemodialysis Noncompliance

The present study seeks to empirically test the widely held assumption that interactions between nurses and hemodialysis patients are related to patients' compliance to the treatment regimen. The proposed study follows the social learning perspective. This approach is deemed superior for several reasons. First, each patient, on average, has thrice weekly, four hour contact with a dialysis nurse. Second, this repeated contact allows relatively intimate social relationships to form between the patient and nurse. In addition, the repeated contact allows nurses to gain an in depth knowledge of the patient's medical condition and patterns of compliance. It also allows sufficient opportunity for a behavior change program to be implemented.

It is proposed that in the interaction between patient and nurse the nurse's behavior is as much influenced by the patient as the patient's behavior is influenced by the nurse. There is some evidence that noncompliant patients are less friendly to nurses (Tucker et al., 1984) and less liked by nurses (De-Nour and Czaczkes, 1976; Tucker et al., 1984). There is also evidence that less liked dialysis patients receive poorer quality health care (Foster and McKegney, 1977-78). Thus, the noncompliant patient may be creating a maladaptive environment through the effect of his or her behavior on the nurse. In addition, this situation decreases the quality of nurses' working life which is reflected in the nurse turnover rate and, consequently, in the cost of hemodialysis.

It is proposed that an effective program to increase compliance needs to start with changing nurses' behavior. Several authors (Kasl, 1975; Zifferblatt, 1975) have questioned the ability of physicians to have a major impact on patient compliance. This is due both to a reluctance to get intimately involved in anything other than the the patient's physiological condition as well as to insufficient time to properly attend to compliance problems. Both authors suggest the use of other

medical practitioners such as specially trained nurses and psychologists.

The present study will examine nurse-patient interactions during the dialysis procedure and how these interactions are related to patients' level of compliance. Four categories of behavior will be coded using the Bales Interaction Process Analysis (Bales, 1950). These categories include emotionally positive responses, emotionally negative responses, treatment related questions, and treatment related responses.

Hypotheses

Based on a review of the literature and on social learning theory, the following hypotheses are proposed:

1. Noncompliant patients will emit more emotionally negative responses and fewer emotionally positive responses than compliant patients.

2. Noncompliant patients will ask fewer treatment related questions and give fewer treatment related responses than compliant patients.

3. When interacting with noncompliant patients nurses will give fewer treatment related responses than when interacting with compliant patients.

4. Nurses will ask fewer treatment related questions of noncompliant patients than compliant patients.

5. Nurses will emit more emotionally negative responses and fewer emotionally positive questions when interacting with noncompliant patients than with compliant patients.

CHAPTER III
METHOD

Subjects

The subjects consist of 13 staff nurses and 38
hemodialysis outpatients at the North Florida Kidney
Center, a private treatment facility. Nurses ranged in
age from 23 to 46 years with a mean of 31.6. Nurses'
work experience in dialysis ranged from 3 to 108 months
with a mean of 38.1. The 13 nurses represent all staff
members responsible for routine treatment. Demographic
information collected on patients included age, length
of time on hemodialysis, marital status, years of
formal education and sex. Patient age ranged from 30
to 67 with a mean age of 53.2. Length of time on
hemodialysis ranged from 11 months to 110 months with a
mean of 45.3. Marital status consisted of 17 married
(46%), 6 single (16%), 8 divorced or separated (21%),
and 7 widowed (18%). Years of formal education ranged
from 3 to 18 with a mean of 9.27. Sex of patients
consisted of 18 males (46%) and 20 females (54%).

The 38 patients are from a total patient
population of 52. Exclusion from the subject group was
due to the standard operating procedure at the dialysis

unit, isolation of patients with infectous diseases, or hospitalization. The standard operating procedure randomly assigns patients to nurses for each dialysis treatment.

The Setting and Treatment Procedure

North Florida Kidney Center has 16 dialysis machines arranged in a rectangular array. Upon their arrival at the dialysis unit, the patients' body weight is measured and weight gain since the previous treatment is recorded in the patients' medical charts. Patients then go to one of the 16 dialysis machines to which they have been assigned and are seated in a reclining chair. The nurse supervising treatment begins by taking the patient's vital signs. This information is used along with weight gain to calibrate the dialysis machine. An IV needle is then inserted in the patient's arm and dialization begins. If there are no immediate complications, nurses then go about other duties. Nurses are responsible for the simultaneous treatment of two or three patients per patient shift. Nurses have intermittent contact with their patients throughout the three to four hours each treatment lasts.

Measures

Interaction Process Analysis (IPA). Interactions between patients and nurses were coded using a modified version of the Interaction Process Analysis developed by Bales (1950). This instrument includes 12 response categories:

1. Shows solidarity (raises others status, gives help, reward).

2. Shows tension release (jokes, laughs, shows satisfaction).

3. Agrees (shows passive acceptance, understands, concurs, complies).

4. Gives suggestion (direction, implies autonomy for other).

5. Gives opinion (evaluation, analysis, expresses feeling, wish).

6. Gives orientation (information, repeats, clarifies, confirms).

7. Asks for orientation (information, repetition, confirmation).

8. Asks for opinion (evaluation, analysis, expression of feeling).

9. Asks for suggestion (direction, possible ways of action).

10. Disagrees (shows passive rejection, formality, withholds help).

11. Shows tension (asks for help, withdraws).

12. Shows antagonism (deflates other's status, defends or asserts self).

The original version of the IPA is most often used to code interactions that have been videotaped, tape recorded, or transcripts of the verbal events in an interaction. This allows for playback and closer examination of group processes. A modified version of the IPA was used in the present study to allow for the coding of live interactions. Similar modified versions of the IPA have been used to code live group problem solving (Shaw et al., 1981; Shaw et al., 1979). In these studies inter-rater reliability ranged from .74 to .99 with a mean of .94. The 12 above response categories were collapsed into four major areas of interaction:

1. Emotionally Positive (categories 1-3).

2. Treatment Information (categories 4-6).

3. Treatment Questions (categories 7-9).

4. Emotionally Negative (categories 10-12).

Observer training consisted of instruction on how to break verbal responses into communication units which were defined as the smallest discriminable speech segment to which the observer can assign classification to one of the four response categories. A unit may be as short as one word or utterance ("huh" or "O.K.") or

as lengthy as a sentence. Sentence clauses were scored as a communication unit when they convey a single theme, meaning, or thought. All verbalizations were to be categorized unless noise prohibited coding.

Observers consisted of eight undergraduates who received course credit for their participation. Observers received an average of seven one-hour sessions of training on use of the modified IPA depending on their mastery of the technique. Four of the sessions were conducted individually and three were conducted as a group. The group sessions allowed observers to discuss to agreement how various responses would be coded. Thus, the observers, in part, calibrated themselves.

The first 3 training sessions were conducted using a videotape of television programming for instructional purposes. In latter sessions a videotape depicting a nurse putting a patient on the dialysis machine was used. Two nurses from the North Florida Kidney Center participated in making the videotape. One nurse role-played a patient while the other role-played a nurse. The nurses were instructed to display the full range of behaviors that are common to nurse-patient interactions during the time patients are being put on the machine.

Observers were trained to code only verbalizations. However, nonverbal cues could not entirely be excluded from coding since much information is conveyed nonverbally. For example, voice inflection and facial expression convey affective content. Thus, one communication unit can be coded into more than one category depending on nonverbal cues. Coding consisted of frequency counts of responses falling into each of the four response categories.

A second videotape with the two nurses in reversed roles was made for an interrater reliability check. This videotape was similar to the training videotape in that nurses were instructed to display a wide range of behavior common to nurse-patient interactions. Each observer independently coded this videotape. The following interrater reliability coefficients were obtained:

1. Emotionally Positive, .83
2. Treatment Information, .89
3. Treatment Questions, .91
4. Emotionally Positive, .79

These coefficients are similar to those obtained in other studies of patient-practitioner interactions using the IPA (e.g., Carter et al., 1982; Davis, 1971; Stiles et al., 1979).

Index of Complaince. The index of patient
compliance was patients' average between-treatment
weight gain. Average weight gain was calculated for
the four-week period just prior to the beginning of
data collection. Weight gain data were obtained from
patients' medical records.

Procedure

Observers arrived at the dialysis unit and were
seated prior to the patients' scheduled arrival time.
Observations were made on nurse-patient interactions
occurring at the four dialysis machines closest to
where the observers were seated. Only one observer was
present during each patient shift. Coding began as
soon as patients were seated at the dialysis machine
and ended when the machine was turned on, an average
period of about 15 minutes. Only one interaction was
coded at a time. Observers were blind to patients'
level of compliance.

Prior to the beginning of data collection, nurses
were told that students from the University of Florida
would be in the dialysis unit making observations on
patient behavior during dialysis. Nurses were not
informed that their behavior was being recorded.
Patients were told that the students would be in the
dialysis unit to take notes on the dialysis procedure.

If, during the observation period, patients questioned
the presence or actions of the observer the explanation
was reiterated.

CHAPTER IV
RESULTS

A stepwise multiple regression was performed on
the data with noncompliance as the criterion variable
and the eight response categories of the modified IPA
as the predictor variables. The stepwise multiple
regression was used because the procedure adjusts for
the nonindependence of the predictor variables. Table
4-1 shows the ordering of the predictor variables from
the regression model. Stepping was terminated when no
other variables met the .15 significance level for
entry into the model. Nurse Emotionally Positive and
Nurse Emotionally Negative , each with a positive beta,
were the only predictor variables to meet the variables
relating to the dialysis treatment were found to be
predictive of noncompliance.

An additional stepwise regression was performed
using nursing tenure (Length of Dialysis Nursing) as
the criterion variable and the eight IPA response
categories as the predictor variables. Table 4-2 shows
the ordering of the predictor variables from the
regression model. Stepping was terminated when no

other variables met the .15 significance level for
entry into the model. Nurse Treatment Questions with a
negative beta was the variable that accounted for the
most variance in nurses′ length of time dialysis
nursing followed by Patient Emotionally Positive and
Patient Emotionally Negative each with a positive beta.

Correlations among all variables are presented in
Table 4-3. Means and standard deviations of all
variables are presented in Table 4-4.

Table 4-1

Stepwise Multiple Regression Analysis of
Response Categories in Relation to Noncompliance

Variable	R SQUARE	b	F	PROB>F
Nurse Emotionally Positive	.03	0.03	4.16	.04
Nurse Emotionally Negative	.06	0.83	3.33	.07

Table 4-2

Stepwise Multiple Regression Analysis of
Response Categories in Relation to
Length of Dialysis Nursing

Variable	R SQUARE	b	F	PROB>F
Nurse Treatment Questions	.07	-3.51	9.93	.002
Patient Emotionally Positive	.09	0.81	2.22	.13
Patient Emotionally Negative	.16	10.36	3.13	.08

Table 4-4

Means and Standard Deviations of
Predictor and Criterion Variables

Variable	N	M	SD
Noncompliance*	38	2.11	1.23
Nurse Emotionally Positive	125	7.97	6.83
Nurse Emotionally Negative	125	0.03	0.22
Nurse Treatment Questions	125	3.46	2.96
Nurse Treatment Information	125	4.02	3.56
Patient Emotionally Positive	125	6.28	5.94
Patient Emotionally Negative	125	0.07	0.56
Patient Treatment Questions	125	0.66	1.17
Patient Treatment Information	125	5.15	4.53
Length of Dialysis Nursing**	13	38.03	38.02

* Between treatment weight gain in pounds.
** Length of dialysis nursing in months.

Table 4-3

Correlation Coefficients of Predictor and
Criterion Variables*

Variable	2	3	4	5	6	7	8	9	10
1. NC	.18	.16	.00	.02	.13	.14	-.02	.03	.09
p.<	.04	.07	.92	.74	.12	.12	.77	.68	.29
2. NEP		.00	.20	.40	.91	.00	.00	.44	.01
p.<		.99	.02	.001	.001	.97	.97	.001	.88
3. NEN			-.05	.00	.03	.84	.13	-.04	.15
p.<			.59	.99	.74	.001	.12	.68	.08
4. NTQ				.46	.06	-.03	.04	.76	-.27
p.<				.001	.48	.78	.59	.001	.002
5. NTI					.32	.07	.37	.74	-.14
p.<					.001	.38	.001	.001	.10
6. PEP						.03	.06	.30	.11
p.<						.74	.45	.001	.20
7. PEN							-.01	-.06	.16
p.<							.90	.51	.07
8. PTQ								.18	.03
p.<								.04	.69
9. PTI									-.24
p.<									.007
10.LDN									-

* Abbreviations of Variable Names
1. Noncompliance=NC
2. Nurse Emotionally Positive=NEP
3. Nurse Emotionally Negative=NEN
4. Nurse Treatment Questions=NTQ
5. Nurse Treatment Information=NTI
6. Patient Emotionally Positive=PEP
7. Patient Emotionally Negative=PEN
8. Patient Treatment Questions=PTQ
9. Patient Treatment Information=PTI
10. Length of Dialysis Nursing=LDN

CHAPTER V
DISCUSSION

Five major hypotheses were investigated in the
present study:

1. Noncompliant patients will emit more
emotionally negative responses and fewer emotionally
positive responses than will compliant patients. The
results do not support this hypothesis. In fact, the
data reflect the opposite, but statistically
insigificant, relationship. Higher levels of
Noncompliance were positively correlated with both
Patient Emotionally Positive ($r=.13$, $p<.12$) and Patient
Emotionally Negative ($r=.03$, $p<.11$).

2. Noncompliant patients will ask fewer treatment
related questions and request less treatment
information than will compliant patients. The results
indicate that there is little relationship between
Noncompliance and Patient Treatment Questions ($r=-.02$,
$p<.77$) and Patient Treatment Information ($r=.03$,
$p<.68$).

3. When interacting with noncompliant patients
nurses will give less treatment information than when
interacting with compliant patients. The results
indicate no significant relationship between

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Noncompliance and Nurse Treatment Information ($r=.02$, $p<.74$).

4. Nurses will ask fewer treatment questions of noncompliant patients than compliant patients. The near zero correlation between Noncompliance and Nurse Treatment Questions ($r=.00$, $p<.92$) does not support this hypothesis.

5. Nurses will emit more emotionally positive and fewer emotionally negative responses when interacting with noncompliant patients than with compliant patients. This hypothesis received partial support with a significant correlation between Noncompliance and Nurse Emotionally Positive ($r=.18$, $p<.04$). However, the opposite of the predicted relationship was found for Noncompliance and Nurse Emotionally Negative with a positive relationship between the two variables ($r=.16$, $p<.07$).

Nurse Emotionally Positive and Nurse Emotionally Negative were the only two predictor variables that met the .15 significance level for entry into the stepwise regression model. The two variables accounted for a modest amount of the variance in Noncompliance (R SQUARE$=.06$, $p<.03$).

The present findings are inconsistent with those of previous studies examining patient-practitioner interactions. None of the four response categories

concerning treatment related questions and information were related to noncompliance. The data indicate that compliant patients did not emit any more or less treatment related responses than did noncompliant patients. Likewise, nurses did not emit any more or less treatment related responses when interacting with compliant patients than with noncompliant patients. Previous studies (Carter et al., 1982; Davis, 1972; Inui et al., 1982) have found that noncompliant patients ask fewer treatment related questions and give less treatment related information than compliant patients. Similarly, when interacting with noncompliant patients nurses were found to ask fewer treatment related questions and give less treatment information than when interacting with compliant patients. In other words, in these studies noncompliant patients tended to have a lower level of active involvement in treatment than compliant patients. Nurses were also found to be less active in the treatment of noncompliant patients than compliant patients.

It is surprising that the present study found emotionally positive responses by nurses to be positively associated with patient noncompliance. Noncompliant dialysis patients are commonly depicted as being hostile, uncooperative, and aggressive (Rabin,

1983). Reports of the difficulty of working with noncompliant patients are common in hemodialysis units. It is counterintuitive that nurses emit more emotionally positive responses when working with noncompliant patients.

The findings regarding nurses' behavior can best be explained in light of the findings on Length of Dialysis Nursing. This variable was negatively correlated ($r=-.27$, $p<.002$) with Nurse Treatment Questions. A marginally significant negative correlation ($r=-.14$, $p<.10$) between Length of Dialysis Nursing and Nurse Treatment Information was obtained. These findings indicate that nurses become less actively involved in patient treatment the longer they are in dialysis nursing. It is proposed here that these relationships are the result of the ineffectiveness of nurses' in increasing patient compliance.

Social learning theorists (Bandura, 1977; Kanfer and Phillips, 1970) posit that anxiety and defensive behavior result from repeated contact with aversive stimuli. Avoidance behavior is adopted and maintained when it offers protection against potential hazards. It is proposed here that the aversive consequences associated with nurses' efforts to increase patient compliance are avoided by terminating those efforts.

Nurses adopt this strategy over time as efforts to
increase compliance go unreinforced. It is not
surprising that nurses often report feeling that they
receive little in return for their efforts to improve
the quality of patient care (Wertzel et al., 1977).

It is interesting that Patient Emotionally
Positive and Patient Emotionally Negative were
significant predictors of nursing tenure. It appears
that familiarity with nurses leads to freer expression
of patients' feelings. This finding emphasizes the
importance of the long-term nature of nurse-patient
relationships in hemodialysis.

The question remains as to why the findings for
the relationship between Noncompliance and the IPA
response categories involving treatment related
behavior are inconsistent with, and in some cases
contrary to, other studies examining patient-
practitioner interactions. This inconsistency is
likely due to the subject populations that have been
examined. Inui et al. (1982) reviewed 17 studies
conducted since 1965 that examined patient-practitioner
interactions. The present author reviewed those
studies to examine the characteristics of the subject
populations involved. None of the reviewed studies
controlled for characteristics of the treatment
regimens. The majority of the studies examined

patient-practitioner interactions in outpatient clinics where patients were treated for a variety of health disorders. None of the studies concerned patient treatment for chronic illnesses. Moreover, the most common types of medical practitioners investigated were physician interns and medical students. This is probably due to a reluctance of veteran physicians to submit themselves as subjects of empirical investigation. The behavior of interns and students when interacting with patients is likely to be substantially different than that of experienced practitioners who have an extended history with patients.

Another difference between the subject population of the present study and those of previous studies is that hemodialysis nurses have an extended history of interaction with individual patients. Treatment at outpatient clinics is almost always for acute disorders. This type of patient-practitioner interaction seldom results in an intimate personal or professional relationship. The opposite has been found for the relationships between hemodialysis nurses and patients with both patients and nurses forming close personal and professional ties with each other (Asterund, 1972; De-Nour and Czaczkes, 1974). Significantly different interaction patterns should be

expected for dyads involving long-term patient care
than for those involving short-term care.

Implications for Hemodialysis Nursing

The goal of hemodialysis nursing is to provide
quality patient care. This involves using the
appropriate procedures for dializing patients' blood as
well as directing efforts to increase compliance.
Nurses are potentially effective change agents because
of the extended contact they have with patients. Other
agents, such as physicians, dietitions, social workers,
and psychologists, are also potentially effective.
However, increasing the contact of these people with
patients would increase the cost of treatment. The
most cost-effective strategy for increasing compliance
should center on nurses. The following changes in
treatment procedures are proposed on the basis of the
study results and literature review:

1. Hemodialysis nurses should receive formal
training on patterns of noncompliance among patients,
the behavioral events that characterize interactions
between nurses and patients, and the basic principles
of behavior change involved in compliance. North
Florida Kidney Center nurses receive no training on
patterns of patient compliance or on the behavioral

events that occur between patients and nurses during
dialization.

    2. A compliance increasing program should be
incorporated into the routine dialization procedure.
This program should be formally stated in nurses′ job
description. If required as part of the nurses′ job
compliance increasing efforts will be more resistent to
extinction resulting from inefficacy in affecting
compliance.

    3. A strategy for increasing compliance should be
adopted based on the unique aspects of the hemodialysis
regimen. No single strategy emerges from the
compliance literature as having the greatest potential
for increasing compliance. However, characteristics of
the regimen suggest several strategies. First, praise
as a reinforcer of compliance has been effective in a
number of studies. The frequent interaction between
patients and nurses and the close personal
relationships that form between them make this an
especially promising reinforcer for compliance.
Moreover, the tight budgets under which most dialysis
units operate make this one of the few reinforcers
available. Second, praise should be made contingent
upon the direct method of assessing compliance readily
available to the dialysis staff. Specifically, a
measure of between treatment weight gain is obtained at

each of the thrice weekly dialysis treatments. Praise
contingent upon compliant weight gain is likely to be
especially effective since it follows closely in time
the compliance related behavior.

    4. The three- to four-hour period during which
the patient is being dialized should be used to
intermittently present information on the dialysis
regimen and consequences of noncompliance. The
hemodialysis regimen is complex and involves a
diversity of behavior. Additional educational efforts
should increase retention of information related to the
regimen which is necessary for complying with it.

Limitations and Directions for Future Research

    The correlational design of the present study
includes built-in limitations which suggest that
conclusions be drawn carefully. The key limitation is
that, as in the case of any correlational design,
causal relationships among variables are not revealed.
Thus, the observed interaction patterns should be
viewed as the product of reciprocal determinism rather
than as the process of reciprocal determinism. Had the
design included manipulations of either patient or
nurse behavior reciprocal effects could have been
observed.

An additional limitation concerns a possible observer-interference effect. Observers were clearly visible to both patients and nurses and this presence may have influenced interactions. This may partially account for the low incidence of emotionally negative responses. However, it is the author's impression from his experience working at North Florida Kidney Center and discussions with the observers of the present study that nurses and patients quickly ignore the presence of outsiders.

The present description of nurse-patient interaction patterns and how they relate to patient compliance and nursing tenure is an important step towards understanding and increasing patient compliance. Social learning theorists posit that change agents can be optimally effective when they have a good understanding of the patterns of behavior to be changed. The data obtained in this study provide an important starting point for educating nurses on factors associated with compliance and devising strategies for increasing compliance.

Future research should focus on how nurses' behavior can be altered to increase compliance. Research should examine the effect of systematic verbal punishment or praise on compliance. Nurses employ these verbalizations but they do not appear to be

directly linked to patients' level of compliance nor is its effect on compliance understood. Implementing such a program of research will, almost necessarily, have to occur in a clinical setting. Success will likely depend on conducting studies in a research oriented institution in which the cooperation of administrators and staff can be obtained.

NURSE   ID _____
PATIENT   ID _____

OBSERVER NAME _____

	Nurse	Patient
A. EMOTIONALLY POSITIVE		
B. TREATMENT INFORMATION		
C. TREATMENT QUESTIONS		
D. EMOTIONALLY NEGATIVE		

This study is concerned with how nurses and patients interact during hemodialysis. During the first 15 or 20 minutes of dialysis treatment an observer will watch you and take notes on the procedure and the interaction between nurse and patient. The treatment will not change in any way during this study.

There are no anticipated risks to participants in this study. The names of nurses and patients observed will not be recorded. Observed behavior will not be discussed with other patients or staff members. Information from participants will be kept in a locked file cabinet in the Psychology Department at the University of Florida.

If there are any questions regarding this study participants may call Dr. Carolyn Tucker at (904) 392-1532 or Brett Rorer at (904) 392-0601 or write to him at Box 85 Dept. of Psychology, University of Florida, Gainesville, FL 32611. Dr. Tucker or Brett Rorer will respond by telephone or letter as specified by the participant.

A participant who consents to participation in this study may withdraw his or her consent at any time and discontinue participation in the study at any time

without prejudice. No monetary compensation is being
offered for participation in this study.

I have read and understand the procedure described
above. I agree to participate in the procedure and I
have received a copy of this description.

Signatures:

Subject	Date	Witness	Date
Relationship if other than subject	Date	Principal investigator's name	Date

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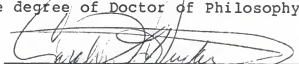<u>Preventive Medicine</u>, <u>4</u>, pp. 173-182.

BIOGRAPHICAL SKETCH

Brett A. Rorer was born on August 25, 1958, in Mansfield, Ohio. He attended the University of Florida where he received a Bachelor of Science degree in August, 1980, and a Master of Science degree in August, 1982. The Doctor of Philosophy degree will be conferred in May of 1986, after which he hopes to be employed in marketing research.

I certify that I have read this study and that in
my opinion it conforms to acceptable standards of scholarly
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Robert Ziller, Chairman
Professor of Psychology

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Carolyn Tucker, Cochairman
Associate Professor of Psychology

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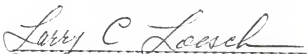as a dissertation for the degree of Doctor of Philosophy.

Franz Epting
Professor of Psychology

I certify that I have read this study and that in
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presentation and is fully adequate, in scope and quality,
as a dissertation for the degree of Doctor of Philosophy.

Greg Neimeyer
Assistant Professor of Psychology

I certify that I have read this study and that in
my opinion it conforms to acceptable standards of scholarly
presentation and is fully adequate, in scope and quality,
as a dissertation for the degree of Doctor of Philosophy.

Larry Loesch
Professor of Counselor Education

This dissertation was submitted to the Graduate Faculty
of the Department of Psychology in the College of Liberal Arts
and Sciences and to the Graduate School and was accepted as
partial fulfillment of the requirements for the degree of
Doctor of Philosophy.

May 1986

Dean, Graduate School